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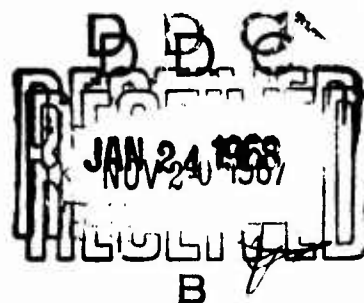
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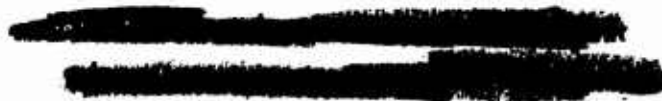# ABSTRACTS OF BESRL RESEARCH PUBLICATIONS -- FY 1967
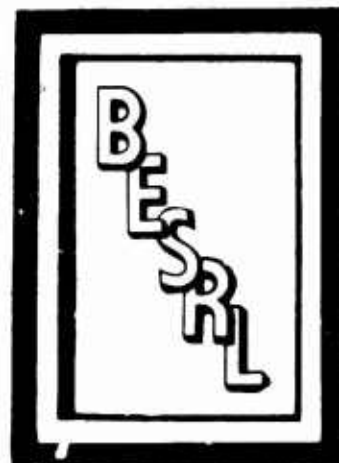
by Emma E. Brown

Office of the Director

August 1967

U. S. Army
Behavioral Science Research Laboratory

BEHAVIORAL SCIENCE RESEARCH LABORATORY

An activity of the Chief, Research and Development

J. E. UHLANER
Director

M. O. BECKER
Colonel, GS
Commanding

NOTICES

Technical Research Note 191

ABSTRACTS OF BESRL RESEARCH

PUBLICATIONS -- FY 1967

By Emma E. Brown
Office of the Director

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U. S. ARMY BEHAVIORAL SCIENCE RESEARCH LABORATORY
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Department of the Army

Washington, D. C. 20315

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BEHAVIORAL SCIENCE RESEARCH LABORATORY

Research Publications

Technical Research Reports

BESRL Technical Research Reports are publications describing completed research studies or programs which contribute directly to the solution of Army human factors problems. The Report is generally divided into two parts--a brief general report to management and a technical supplement.

Technical Research Notes

BESRL Technical Research Notes are of interest primarily to technically trained research workers in the Department of Defense and in other government research agencies. Notes present technical information concerning research methodology or basic psychological knowledge growing out of the work program.

Research Studies

BESRL Research Studies are special reports to military management, generally prepared in response to questions raised by operating agencies when early answers are needed. Research Studies may include presentations to military management, interim bases for changes in personnel operations, and bases for research decisions. Distribution is usually limited to operating agencies with a direct interest in the content.

Research Memorandums

BESRL Research Memorandums are informal reports on technical research problems. Research Memorandums include the following types of content: details concerning construction of experimental instruments, fragmentary or incidental data, and methodological developments relating primarily to in-house technical operations. Limited distribution is made, primarily to personnel engaged in research for the U. S. Army Behavioral Science Research Laboratory.

Technical Research Note 191

Abstracts of BESRL Research Publications --
FY 1967

CONTENTS

INTRODUCTION

Abstracts have been prepared for the majority of FY 1967 publications of the U. S. Army Be vioral Science Research Laboratory. Where a publication has been abstracted, the principal research findings have been described as much as possible in non-technical language. Technical language has generally been used as the most expeditious method of communicating details of research and analysis.

BESRL research publications are numbered consecutively and continuously from year to year, in separate series for the four types of publication. Publications released during FY 1967 include Reports 1150 through 1152, Notes 175 through 189, Research Studies 66-5, 66-6, and 67-1, and Research Memorandums 66-5 through 66-11 and 67-1 and 67-2. Research Note 191 identifies both by publication serial number and by Research and Development Research Task all research publications prepared and released by the U. S. Army Behavioral Science Research Laboratory in FY 1967. The listing includes 3 Technical Research Reports, 15 Technical Research Notes, 3 Research Studies, and 9 Research Memorandums.

End-products of PESRL research are frequently in the form of personnel tests implemented by the appropriate user agency to aid in the selection, classification, management, and utilization of Army personnel. About 30 personnel programs in the Army make use of more than 100 BESRL research test products. Estimates of the numbers of Army personnel tested in these various programs during FY 1967 appear in the last section of this publication.

Distribution of BESRL Publications

Initial distribution of each Research Report and Research Note is made directly by the U. S. Army Behavioral Science Research Laboratory. Research Reports are distributed primarily to operational and research facilities and their sponsors in the Department of Defense, to other interested governmental agencies, and to the Library of Congress which in turn distributes to depository libraries. Research Notes are distributed primarily to technically trained research workers, including those reached through Library of Congress channels.

Qualified requestors may obtain copies of Technical Research Reports and Technical Research Notes directly from DDC. Copies may be purchased from the Clearinghouse for Federal Scientific and Technical Information, Department of Commerce, Springfield, Virginia 22151.

Copies may also be obtained on loan from depository libraries in many metropolitan and university centers. A list of these libraries appears on Pages 34 through 40.

Research Studies and Research Memorandums are not available for general distribution.

Operational tests are for official use only.

ABSTRACTS

BESRL Research Publications -- FY 1967

TECHNICAL RESEARCH REPORTS

1. TRR 1150.   Robert W. Brainard (North American Aviation, Inc.), Robert Sadacca (U. S. Army Behavioral Science Research Laboratory), Louis J. Lopez and George N. Ornstein (North American Aviation, Inc.). Development and evaluation of a catalog technique for measuring image quality. August 1966.

The interpretation task is characterized by large quantities of imagery to be rapidly interpreted. Quality of the imagery varies over a considerable range, depending on such factors as camera and film used, atmospheric conditions, platform characteristics, and film processing. Some imagery, in fact, is so difficult to interpret as to be of little or no value. An efficient technique for assessing the interpretability of imagery is needed to select for detailed interpretation those images which are of sufficiently good quality to permit extraction of the information needed.

The technique most frequently considered for assessing image interpretability is to calculate contrast, acutance, and resolution values from measurements of the spatial-density characteristics of the imagery and to take these quality parameters as indications of the amount and accuracy of information that can be extracted by interpreters. However, relationships between image quality parameters and interpreter performance have frequently been found too tenuous to encourage practical application. Further, the measurement procedure is laborious and costly. The use of judgments would provide a simpler method of assessing image quality. To convey the interpreter's meaning to users and from user to user, however, the judgments must be made in a standard context. In the present study, the means of providing a standard set of images--the image catalog--for comparison purposes was investigated. The catalog technique requires the interpreter to compare a new image he is interpreting with images in the catalog and to select the catalog image most similar in quality to the new image. Indexes associated with the selected catalog image are taken as measures of the interpretability of the image. The experimental image catalog contained 231 images of diverse scene content and quality. The image variants were assigned indexes based on the measured performance of 154 interpreters. The catalog technique had a high degree of validity, both when used by 30 experienced interpreters (for discrimination of targets, the average correlation coefficient was .77; for identification of targets, .54) and by untrained subjects (r = .70 and .51).

Two other techniques were also effective--one using weighted physical characteristics of the image including scale and resolution, the other using the weighted characteristics plus catalog judgments. The combined technique was best for target area discrimination (.86 vs .52 for target identification). The technique using physical characteristics was best for target identification (.60 vs .43 for target area discrimination). The catalog method had the advantage of being quicker and less complex.

A comprehensive image catalog based on the prototype developed in the present study and including a greater variety and range of image variants could fulfill the operational requirement for a simple and efficient means of measuring the quality of an image. The U. S. Army Behavioral Science Research Laboratory is working toward the development of such a catalog.

2. TRR 1151. George W. Doten and John T. Cockrell (System Development Corporation) and Robert Sadacca (U. S. Army Behavioral Science Research Laboratory). The use of teams in image interpretation: Information exchange, confidence, and resolving disagreements. October 1966.

Earlier BESRL studies had demonstrated that teams can extract more accurate and more complete information from imagery than can individuals. Gains, however, varied with team organization, number of members, and work procedures. Teams were shown to be most valuable in interpreting the more difficult imagery.

The present set of studies centered on team interactions and was designed to reduce the time required for team interpretation while maintaining the superiority of team procedures in the accuracy and completeness of the information extracted.

Using the common procedure of having each team member check the interpretations made by his teammate, three experiments were formulated around the following questions: (1) How much knowledge should the checker have of the initial interpreter's work? (2) How accurately can the initial interpreter rate the accuracy of his interpretations?--How effectively can he designate interpretations of his which need checking? (3) How can a third interpreter best be utilized to resolve conflicts in interpretations made by the original two-man team? Variations introduced were in the amount of information passed from initial interpreter to checker, discussion between team members vs no discussion, consensus vs one-man decision, confidence levels made by interpreters and confidence levels below which interpretations were checked, and varying roles of the third team member.

Teams in which the checker had complete knowledge of the initial interpreter's product produced more complete results with greater efficiency. Initial interpreters can judge the accuracy of their interpretations only to a limited extent. Use of confidence judgments to limit the amount of checking done had little effect on team output, with the exception of some increase in efficiency. Team output was more complete when a third man was introduced into a two-man team, but efficiency was reduced. Results with different methods of arriving at the team product pose a tradeoff situation. Arbitrary decision by the checker produced the most complete interpretation but the lowest accuracy. Consensus yielded higher accuracy but less complete interpretation. A discussion procedure with consensus requirement was both accurate and complete, but again efficiency was reduced.

When complete information is required from an imagery mission, and timeliness is essential, team members should check each other's work without discussion, and decisions made by the checker should determine the information reported. When a greater degree of accuracy is desired, only information agreed upon by the team members should be accepted. A reasonable balance is achieved in two-man teams by adding the discussion procedure and then accepting only information agreed upon by both members. In other words, the user must choose between completeness and accuracy or be content with reduced efficiency, at the same time trying to improve both completeness and accuracy.

3. TRR 1152. Richard C. Sorenson. Amount of assignment information and expected performance of military personnel. October 1966.

In the design of manpower systems for deferment, selection, assignment, and reassignment of personnel, critical gain or loss in the effectiveness of the personnel system can accrue from variations in the kind and amount of information about the individual that enters into operational decisions concerning his assignment. Consider the use of Army Classification Battery (ACB) scores in classifying Army enlisted men for training and jobs. For initial assignment, the Army relies largely on aptitude area scores. The eight current aptitude area scores are each a composite of two tests of the ACB. While all ACB tests were standardized to have a mean of 100 (effective range, 40 - 160), it has been operational procedure to transform the aptitude area scores derived from these tests to single-digit scores ranging from 0 to 9.

In this procedure, there are two sources of information loss. Amount of information is lost by use of the one-digit score in place of the original 2- or 3-digit score. Coarser discriminations are made than would be possible using the original scores. Amount and kind of information is curtailed by using only two tests to determine qualification for a given occupational area, whereas other tests might provide information on additional characteristics relevant to the job.

Through computerized simulation, alternative manpower information policies and procedures were evaluated. Interest was in determining the effect of changes in the number of significant digits recorded and used in processing assignment information and also the effect of changes in qualifications for induction.

For evaluating results of these and other policy alternatives, BESRL research scientists have found the "allocation average" to be a satisfactory criterion. The allocation average is defined as the average of expected performance on all jobs to which men are assigned. Within this research framework, these findings are of particular interest:

1. Total performance of Army enlisted personnel could be enhanced by using the full 2- or 3-digit scores in optimal assignment procedures. The effect of the 1-digit scores is more serious when the range of ability in the allocation group is narrow and where the general level of ability is lowered.

2. More precise prediction of job performance could be attained by using performance estimates more closely resembling least squares regression estimates based on the full ACB.

3. There are other transformations--for example, ranking jobs within individuals--which preserve the 1-digit form of recording personnel information and at the same time yield more effective assignment than the present 0 - 9 coded scores.

TECHNICAL RESEARCH NOTES

4. TRN 175. Eugene P. Stichman. Transcriber confidence in relation to accuracy of transcription. July 1966.

When a voice-radio message is partially masked by noise, the transcriber often has subjective impressions of the accuracy with which he has been able to transcribe the message or sections of the message, varying from certainty of its correctness to complete lack of confidence. The present study dealt with the ability of transcribers to judge the accuracy of their reception and transcription of voice-radio communications partially masked by noise. Subjects with no previous training or experience in communications rated their confidence in the accuracy of their transcription using a five-point scale ranging from "fully confident" to "not at all confident." Measures of accuracy of transcription and expressed confidence were obtained under each of three signal-to-noise ratios representative of a broad range of listening conditions.

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Operators were moderately successful in rating the accuracy of their transcripts. Both overconfidence and underconfidence were evident. For transcripts of which operators were "fully confident", an average of 68 percent were correct. For transcripts given the lowest confidence rating, 87 per cent were incorrect. Having operators judge the accuracy of their work as they transcribed did not affect the average intelligibility of the transcripts.

Both mean intelligibility and mean confidence ratings increased as a direct function of listening conditions (signal-to-noise ratios). However, the relationship between confide.ce and accuracy was not affected by listening conditions.

To summarize, a positive relationship exists between transcriber confidence and message intelligibility even when relatively inexperienced personnel serve as transcribers. Since this relationship does not vary with changes in the signal-to-noise ratio, an estimate based on all listening conditions investigated is a stable measure and the best practical basis for field prediction of transcriber performance.

5. TRN 176. Richard S. Laymon (System Development Corporation). An experimental study of two methods of indexing tactical imagery. July 1966.

A tactical image interpretation facility incorporates stored reference materials to assist the image interpreter in extracting information from new imagery. These stored references include maps, illustrations of targets, keys, rolls of tactical imagery from prior missions, and interpreter reports. These materials must be organized so that an interpreter can quickly determine the availability and location of specific reference items, and can easily retrieve materials pertinent to specific geographic areas. Two methods of indexing rolls of tactical imagery were evaluated in the present study. In the graphic index, the primary index data are plots of image coverage of an area, the plot being keyed to a map base. In the textual index, area coverage is represented by letter-number combinations which refer to areas on a map grid which may be superimposed on a map.

Interpreters were required to obtain from graphic and textual indexes the accession numbers of coverage for a given area. The problems required use of the indexes in a variety of experimental conditions including areas of different sizes and areas which overlapped two map sheets. Time taken to reach a correct solution was recorded to the nearest second. With the textual index, interpreters took less time on the average when the indexed areas were small. With the graphic index, they took less time when the areas were large. Results point to the greater utility of the graphic index in a manual system where coverage of large geographical areas is required or if image coverage has to be precisely defined. The textual index appears more useful in a computerized system where coverage of small areas is required or if less precise definition of the image will suffice.

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6. TRN 177. Emma E. Brown. Abstracts of U. S. AFRO research publications--FY 1966.
    September 1966.

Publications abstracted include Technical Research Reports 1143 through
1149, Technical Research Notes 156 through 174, Research Studies 65-5
through 65-7 and 66-1 through 66-4, and Research Memorandums 65-5 through
65-9 and 66-1 through 66-4.

Included are descriptions of 15 research Tasks covering activities reported
in the 42 abstracted publications, a list of the libraries in universities
and metropolitan centers in which these publications are routinely deposited,
and a listing of the U. S. Army personnel programs utilizing psychological
test programs of the U. S. Army Behavioral Science Research Laboratory.

7. TRN 178. Frank L. Vicino and Seymour Ringel. Decision making with updated graphic vs
    alpha-numeric information. November 1966.

In automated tactical operations systems currently under development, the
commander and his staff are provided with information--tactical operations
data and administrative support data--needed for decision making. The
information can be displayed in the form of tables and totes (alpha-
numeric) or in the form of flag symbol overlays on map backgrounds (graphic).
Which type of display would be more useful in future systems? Should both
capabilities be included?

Another flexible aspect of information displays has implications for the
quality and timeliness of decision making--the rate of updating the infor-
mation. Displays can be updated frequently with fewer changes per update,
or less frequently with more changes per update.

The present study compared the effects of alpha-numeric and graphic presenta-
tion on the accuracy and timeliness of decision making and confidence in the
decision made. These variables were examined in the context of a simulated
constantly changing battlefield situation. The experimental procedure
also permitted evaluation of the effects of two rates of updating the
information.

A series of slides depicting three enemy sectors was presented to 37 subjects.
Successive slides showed the enemy forces in one of the three sectors form-
ing for attack at a faster rate and with more appropriate disposition of
forces than the forces in the other two sectors. After each slide was
presented, each subject was asked to make a decision as to which of the
enemy forces was preparing to attack and to indicate how confident he was
about the decision. At each stage, the subject had the option of declaring
his decision final. The same battlefield information was presented alpha-
numerically and graphically, and for each mode of display the scenario
unfolded at two different rates of updating--7 vs 14 updated slides.

No differences in quality or timeliness of decision or in confidence that a decision was correct were found between the two modes of presentation nor with the two rates of updating. Results bring into question the utility of introducing elaborate symbol generation and display devices in future systems, at least for non-emergency conditions. Subjects showed greater shifts in level of confidence from slide to slide in the 7-slide updating than in the 14-slide updating. On the average, subjects whose final decision was correct had made the correct response approximately three-fourths of the way to their final decision. Evidently, rate of updating can be slowed down without degrading decision behavior.

8. **TRN 179.** Boyd L. Mathers (System Development Corporation). Relative effectiveness of different viewing devices for photo interpretation. November 1966.

Among the objectives of the IMAGE INTERPRETATION DISPLAYS Task is the evaluation of image enhancement devices used in the presentation or viewing of images and references. Until recently, a light table was the only viewer available to image interpreters for use in the analysis of aerial photographs. Advances in technology have led to the development of more sophisticated viewing equipment. Rear-projection viewers, for example, are available to supplement--or supplant--light tables.

Two experiments were conducted, the first to evaluate rear projection as a means of displaying photographs, the second to determine the effect of magnification in the rear projection method, since an advantage of rear projection is its capability of magnifying the total image. Interpreter performance in screening, quick-time, and detailed interpretation tasks was compared under three methods--rear projection, light table, and magnified projection. In a separate experiment, using only projection, performance on the same three tasks was compared when different levels of image quality, scale, and magnification were used.

Significantly better performance on quick-time tasks resulted under the light table method than under the other two methods. Imagery of the larger scale yielded significantly better performance on both quick-time and detailed interpretation tasks. While results in these studies favored the light table, the findings are not broad enough in themselves to warrant rejection of rear projection systems for tactical image interpretation facilities.

9. **TRN 180.** N. E. Willmorth (System Development Corporation). Influence of overlap on speed and accuracy in screening imagery. February 1967.

In research on stereoviewing in image interpretation, the technique has not shown enhancement of results with run-of-the-mill imagery. However, the possibility remained that the overlapping coverage required for stereoviewing could improve results in the rapid screening of masses of imagery

to select frames for detailed interpretation. Photos taken from slightly
different angles may improve the penetration of cover and provide additional
cues to the size, shape, and function of an object. The present study
initiated a broad investigation of the value of screening by examining
the effect of overlapping coverage provided by adjacent frames. Both
screening and interpretation are influenced by a multitude of factors,
including scale and quality of imagery, target priorities, and informa-
tion available about the terrain covered by the imagery.

Student interpreters screened imagery with overlapping frames and comparable
imagery with no overlap. The factorial design combined the overlap-no
overlap conditions with variations in type of transparency (positive vs
negative), quality of imagery (high or low), and two sets of imagery in
16 conditions.

With overlap, detection of potentially useful frames took considerably
more time, with negligible increase in completeness and no increase in
accuracy. Negative transparencies, with overlap or without, were screened
at about the same speed as positives, but with somewhat less accuracy and
completeness and a greater number of errors. Low quality imagery, both
with overlap and without, reduced accuracy and completeness but not screen-
ing time. Improvement in screening performance from trial to trial suggests
that with more experience in screening, interpreters might achieve much
faster and more accurate screening than in the present experiment. The
fact that completeness of screening, although it did not improve, was not
degraded as speed increased is encouraging.

10. **TRN 181.** William H. Helme. Validation of interest scales for construction and mechanical
jobs. February 1967.

The aptitude area measures used in the classification of enlisted men are
kept up to date and effective by developing new tests and improving exist-
ing tests for incorporation in the Army Classification Battery. A current
major effort is devoted to research on attitudes, interests, and other
motivational factors associated with differential motivation for train-
ing and performance of jobs in broad occupational areas. A new interest
questionnaire, the Army Job Activities Questionnaire-Mechanical, was con-
structed to measure aspects of enduring motivation of the new recruit with
a view to developing predictors of training success and performance in
different types of mechanical jobs. Internal analysis of the items, based
on a general enlisted sample, yielded eight job motivation scales. Analysis
of item validity yielded three empirical scales. Samples of input to eight
MOS were used to obtain unbiased estimates of validity for all scales.

Within given factors, scales based on item validity data proved more effec-
tive predictors of training performance in independent samples than did
the remaining sets of items from the same factors. There was little
difference, however, in prediction of job performance. Expressed pre-
ference for specific jobs and the empirically valid scales based on item

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analysis appear to afford the greatest possibility of adding to the dif-
ferential validity of the Army Classification Battery in the mechanical domain.
Item analysis scales representing Power, Danger, Technical, and Medical-
Technical factors have been included in a comprehensive validity study of
operational and experimental predictors encompassing 125 MOS across all
Army occupational areas.

11. **TRN 182.** N. E. Willmorth (System Development Corporation) and Abraham H. Birnbaum
(Behavioral Science Research Laboratory). Influence of screening and overlapping imagery
on speed and accuracy of photo interpretation. April 1967.

Research scientists of the INTERPRETER TECHNIQUES Task are conducting a
series of studies to determine the effect of various imagery characteristics
and task-associated factors on the speed and accuracy with which aerial
photographs are screened and interpreted. A prior study (TRN 180) dealt
with the effect of overlapping imagery on the rapid screening of positive
and negative transparencies of differing quality. In the present study,
focus was on the effect of screening on the interpretation process itself.
The procedure evaluated consisted of screening prior to interpretation
and subsequent interpretation of the frames selected. Comparison was with
the rapid interpretation of imagery that had not been screened.

Student interpreters interpreted positive transparencies under two condi-
tions. In one condition, the photos had been screened by experienced
interpreters. In the other, interpreters used the normal Hot Report pro-
cedure combining frame selection and interpretation in one process. Zero
and 50 percent overlap and two levels of image quality were represented in
the imagery.

The separate screening added significantly to total interpretation time.
Overlapping imagery also added to interpretation time without improving
significantly either accuracy or completeness. While accuracy of both
screening and interpretation was lower with the lower quality imagery,
screening performance was the more seriously affected. The slight dif-
ference in image quality introduced did not seriously affect processing
time.

Except in terms of interpretation time, then, no advantage or disadvantage
was found for screening as a separate procedure prior to interpretation.
Screening may, however, be useful in establishing the need for additional
cover and for setting priorities for image reproduction and interpretation.
With respect to overlap, unless stereoviewing capability is desirable for
other reasons, providing overlapping imagery for rapid interpretation
requirements does not appear worthwhile.

12. TRN 183. Gerard W. Levy, Leonard A. Evans, and John M. Humes (North American Aviation, Inc.) and Robert Sadacca (U. S. Army Behavioral Science Research Laboratory). Probability indexes of image interpreter performance: Development and evaluation. June 1967.

The usefulness of image interpreter reports to commanders and staff in decision making positions would be enhanced if each report carried a valid estimate of its accuracy. The practice of assigning terms such as "possible," "probable," and "positive" to intelligence reports reflects the need for such evaluations. The main purpose of the research reported in TRN 183 was to investigate the feasibility and validity of a more systematic method of estimating the accuracy of a given report. Mathematical equations, using subjective judgments and objective characteristics of an interpreter's performance, were developed to state the probability (1) that information extracted by the interpreter from a given image is in fact correct and (2) that additional information extracted by the interpreter from the image will be correct. To develop the equations, data based on the judgment and performance of trained interpreters were analyzed. The ten best predictors of accuracy of target identification and the eight best predictors of the value of continued search were identified by a variable selection procedure. Predictions generated from the selected variables had substantial validity for accuracy of performance. Judgments on the difficulty of target identification and the interpreter's confidence in his identifications contributed most to the validity. Predictions of the utility of continued search were of generally low validity. Of three levels of interpretation specificity--detection, classification, and identification of targets in the imagery--identification of targets was best predicted.

The effect of providing interpreters with the probability estimates as feedback while they were examining imagery was also explored. Such feedback reduced the number of incorrect identifications, but did not produce improvement in overall accuracy, completeness, or rate of interpretation.

13. TRN 184. James M. McKendry and Paul C. Harrison, Jr. (HRB Singer, Inc.) and Abraham H. Birnbaum and Robert Sadacca (U. S. Army Behavioral Science Research Laboratory). Estimating the value of surveillance information using error-cost matrices. June 1967.

A major objective of the INTERPRETER TECHNIQUES Task is the development of optimal forms of stating what the commander, faced with a tactical decision, requires from the image interpreter. Before research on statements of requirements could begin, there had to be a determination of what the information requirements of tactical commanders are, as well as what requirements interpreters can be expected to meet. The research reported was designed to establish reasonable information requirements as judged by a large number of commanders and to examine the feasibility of expressing such requirements in standard quantified terms. The quantitative statements took the form of estimates of the value of correct surveillance information and the cost of erroneous information.

Fifty tactical situations requiring the identification of targets and varying on such dimensions as terrain, mission, and enemy deployment were developed. A sample of 389 Army captains attending the U. S. Army Infantry School provided data for the development of matrices of costs associated with designated kinds of error in specific situations. Initial analysis determined the target categories for use as row and column headings of the matrices. The relative costs of various types of error represented in the matrices--misidentifications, inventions, omissions--were determined from estimates and ratings made by the officers. The matrices were evaluated in terms of differences in costs assigned to different types of error involving targets in different categories and for different tactical situations.

Judged cost of errors varied considerably with type of error involved. Errors of omission were considered most serious, and misidentifications within a category of targets least serious. Average costs assigned in one situation were not substantially different from those assigned in other situations. However, some situational effects were noted: For example, the cost of errors in identifying mine fields was greater in attack than in defense situations. Errors involving certain targets were consistently judged more costly than errors on other targets. Tanks and missiles were considered the most important, supply facilities the least important, regardless of situation.

The procedure used to obtain the error cost estimates was difficult and time consuming, and the quantitative estimates obtained were of low inter-judge reliability. In comparison, when the officers were asked to rank targets according to the positive value of information about them, the task was performed efficaciously, and inter-judge reliability of the values was high. Since the relationship between target rankings and the more elaborate error cost estimates was close, the use of rankings might well be used as a shortcut in the field to develop error cost matrices.

14. TRN 185. (CONFIDENTIAL) H. C. Strasel (U. S. Army Behavioral Science Research Laboratory) and O. K. Hansen, K. R. Colson, and L. Vettese (Nortronics, Northrop Corporation). Method for developing a laboratory model of an image interpretation system (Unclassified Title). June 1967.

In the design and conduct of studies of image interpretation, there is need for a model of a generalized image interpretation system within which varied experimental conditions can be imposed. The research described was an initial step in the development of a semi-automated system model, in which a method of model development was conceived and evaluated by application to postulated equipment, manning, and mission concepts. The effort proceeded in three phases: (1) definition of the tasks and functions performed in tactical image interpretation facilities; (2) allocation of tasks and functions within a system and synthesis of functions in a semi-automated system; and (3) evaluation of the capabilities of the system represented in the model to meet requirements at the tactical level.

Successive iterations of the model, using data derived from experimentation, should result in a system model which meets requirements of BESRL's Information Systems Laboratory. (Unclassified Abstract)

15. TRN 186. Richard S. Laymon (System Development Corporation). Evaluation of three computer-compatible procedures for using image interpreter keys. June 1967.

Because of the many different kinds of military objects likely to appear on tactical imagery, image interpreters often use reference materials in the form of image interpretation keys as aids in identifying military targets. The use of digital computers in tactical image interpretation systems permits exploration of new techniques for handling reference keys. The computer, for example, may be used in handling keys that have been mounted on slides ("chips"). The interpreter uses a keyboard or other input device to request designated slides which are then displayed by the computer. In effect, the computer is a storage and retrieval system for individual keys. In such a system, the interpreter still must decide which keys are likely to be useful for his purpose.

In order to enhance the utility of keys in a computerized image interpretation system, computer capabilities for aiding an interpreter to select the keys most likely to identify an unknown target were explored. Simulated computer procedures were devised in which interpreters first selected target signatures appearing on checklists. They then designated the target category, and finally the key or keys they wished to see. As a means of evaluating the methods, interpreters were asked to identify vehicles appearing in aerial imagery and to give weight or capacity information about them. Each interpreter identified four targets, using three simulated computer procedures and a manual procedure to select reference keys. Half the interpreters were given imagery of good to excellent quality and half were given imagery that was fair to good.

Results demonstrated the feasibility of using computer methods to select keys for target identification. Identification by reference key was as fast and as accurate with computer-compatible procedures of key selection as with the manual procedure. Interpreters tended, however, to base selection of a key on only one or two signatures even when use of additional signatures would have increased the probability of selecting valid keys. They preferred viewing more than one key before final identification of a target. Refinements in the computer-compatible methods should be directed toward (1) requiring the interpreter to apply in the query procedure all the information about the target that he can extract from the image; and (2) allowing for selection of several keys, rank-ordered as to probable identification with the target.

The modest differences in image quality used was not reflected in significant performance differences under any of the key selection procedures.

16. **TRN 187.** James A. Thomas and Robert Sadacca. Impact of feedback on accuracy of confidence levels assigned by interpreters. June 1967.

Image interpreters tend to have more confidence than is warranted in the accuracy of the information they provide, according to previous BESRL research findings. Means of improving the accuracy with which interpreters judge their product are required before their evaluations can be used operationally to full advantage. The present study dealt with the utility of feedback presented under simulated computerized conditions with a view to improving interpreter judgment in this regard.

Feedback techniques A and C, in which interpreters were given only data on previous rating performance--their own and their own plus that of other classes--resulted in somewhat more accurate expressions of confidence than did technique B, in which interpreters were given their own corrected reports along with the imagery they had interpreted in a previous session. Confidence ratings of the control group were the least precise. While these results indicated that the accuracy of interpreters' confidence ratings can be improved with practice in applying a knowledge-of-results frame of reference, the improved ratings were still generally not very accurate. Evidently, more than two practice sessions are needed to enable the interpreter to reach an operationally useful level of accuracy in evaluating the information he provides.

17. **TRN 188.** A. G. Bayroff and Leonard C. Seeley. An exploratory study of branching tests. June 1967.

In the past several years, BESRL has been actively interested in new approaches to testing which might prove to be improvements over conventional methods particularly with respect to prospective inductees and enlistees. One line of interest has been the branching technique. Branching is provided by programming a test so that an examinee who answers a test item correctly is presented next with a more difficult item, and an examinee who answers incorrectly is presented with an easier item. By contrast, the conventional test is so arranged that all examinees are expected to answer the same items regardless of the correctness of their responses. The branching program has the potential of reducing error in test scores or of providing scores of validity equal to that of the conventional linear test--but with fewer items.

The present publication reports on the trial administration of two branching tests by means of a computerized system with teletypewriter input/output developed by the National Bureau of Standards. The 8 - 9-item verbal and arithmetic reasoning tests and counterpart conventional 40- and 50-item tests of the Army Classification Battery (ACB) were administered to 102 enlisted men. The short branching tests were substantially correlated with the counterpart longer ACB tests ($r = .83$ and $.79$, higher than would be expected with equally short conventional tests). Classical test theory

developed for the construction of linear tests is not entirely appropriate
in developing branching tests. For example, item difficulty indexes based
on population performance are not fully appropriate when each examinee is
tested with questions geared to his own ability level.

18. TRN 189. James A. Thomas and Robert Sadacca. Rapid screening of tactical imagery as a
function of display time. June 1967.

Image interpretation facilities are called upon to process an increasing
volume of aerial surveillance imagery. A logical means of dealing efficiently
with the quantities of photographic frames received is screening--the pro-
cess of selecting for detailed interpretation those frames which have high
potential intelligence value. The interpreter is presented with a large
number of imagery frames, each frame being displayed for a brief time.
The interpreter has to decide very quickly whether a frame contains suffi-
cient information to warrant being earmarked for further analysis. Of
primary concern is the length of time an image should be displayed and the
effect of varying display time on the precision with which frames of high
intelligence potential are selected.

Two samples of interpreters, each sample consisting of three matched groups,
screened imagery at three display time intervals--5, 15, and 25 seconds per
frame for Sample 1, and 10, 20, and 30 seconds per frame for Sample 2.
While scanning a frame, each interpreter (1) annotated on the frame all
areas of military activity detected, and (2) assigned priority ratings of
High, Medium, and Low to each frame to indicate the estimated intelligence
value.

Results definitely favored the priority ratings over the annotations as a
method of screening. The ratings were of high accuracy even for the shortest
viewing interval, and they improved both in accuracy and in validity when
longer time was allowed. Validity in this case was the correlation between
the priority ratings made by the interpreter and the number of areas of
military activity on the frames. The validity of the ratings was higher
with sets of imagery characterized by relatively few target areas and the
less complex background.

Validity of number of annotations per frame was generally low and did not
vary significantly with display time. With the longer display time,
incorrect as well as correct annotations increased in number, a finding
similar to previous BESRL findings for unspeeded interpretation.

RESEARCH STUDIES

19. RS 66-5.   Aaron B. Nadel and Jay B. Mowbray, TEMPO, General Electric Company. Motivation and retention in the U. S. Army. September 1966.

Under contract to BESRL, two research scientists of TEMPO of General Electric examined the broad problem of motivation and retention in the U. S. Army in the framework of the physical, social, psychological, and economic environment of military service. The examination included the effects of recruiting, retention, and retirement factors on the Army career of both officers and enlisted men. As a basis for recommendations, the authors summarize findings of surveys and compilations of information from Army elements and from civilian sources.

20. RS 66-6.   Pauline T. Olson. Manpower rotation models for combined career and non-career systems. October 1966.

Manpower rotation policy models have proved useful in evaluating aspects of Army policy concerning tour length, allocation of strength, and manpower requirements. The first BESRL report on the development and application of manpower models (TRN 156), published in July 1965, dealt with personnel flow considerations relative to the reduction of turbulence. Subsequent accomplishments include the development of analytic models incorporating several levels of complexity and a series of nomograms for evaluating manpower policy alternatives. Several computer programs have been written and used, and a simulation study of a dynamic flow model for a changing system was completed.

In Research Study 66-6, two simplified models are presented which were developed for the purpose of estimating manpower requirements in the career and non-career Army personnel systems, under given tour duration and allocation quotas. The models were developed in response to a request from the Office of the Assistant Secretary of Defense, Systems Analysis, for limited assistance in estimating manpower needs. The study illustrates BESRL's use of mathematical models in the study of manpower problems, and specifically the capability of modeling techniques to respond quickly to specific problems.

21   RS 67-1.   Pauline T. Olson. Study of officer turbulence based on officer tape records. March 1967.

The premature reassignment of Army personnel which was occurring with great frequency in 1964 and 1965 was expected to have adverse impact on military career attractiveness. Of particular concern was the problem of personnel being moved within or out of the Continental United States

before the end of their specified tour. BESRL has studied reassignment problems associated with turbulence from several points of view. The present study was concerned with identifying officer groups who were most often reassigned.

Copies of magnetic tape on officer personnel were obtained from the U. S. Army Data Services Command for November 1964. Three samples were constituted to be representative of different degrees of turbulence. Distributions of the three groups on a number of characteristics were prepared, and the significance of each characteristic for turbulence was evaluated. MOS, prior service overseas, marital status, active duty time, projected date of retirement, grade, date of appointment in the Regular Army, pilot status, and active federal service were significant factors. Non-significant factors were physical profile, race, and component.

Data obtained, plus additional data for FY 1964 and 1965, were used in the development of a flow model relative to the reduction of turbulence in officer assignments. The model can be used to evaluate proposed modifications of policy and procedures as they affect turbulence.

RESEARCH MEMORANDUMS

22. **RM 66-5.** Raymond A. Katzell and Richard S. Barrett (New York University). Selection of Army first-line civilian supervisors--survey of current practices. July 1966.

Local factors in Army installations which affect the selection of first-line civilian supervisors were examined with a view to improving selection practices. The survey was conducted by staff members of the Research Center for Industrial Behavior, New York University, who interviewed personnel officers and second-line supervisors in six installations. The performance appraisal and panel interview are still the official selection instruments and application is open across work groups; yet from 85 to 95 percent of first-line supervisors were found to be appointed from the immediate work group.

23. **RM 66-6.** William H. Helme. Development of interest scales to predict performance in construction and mechanical MOS. August 1966.

As part of the effort to enhance the prediction of MOS training and job performance in the mechanical domain, measures of the occupational interests and goals of the new recruit are under development. The experimental Army Job Activities Questionnaire-Mechanical was administered to samples of input

to selected training courses so as to obtain item validity coefficients for evaluations of training and job performance. Empirically valid scales were developed which are to be validated on independent samples in the next research stage.

24. RM 66-7. Calvin J. Green. Development of item pools for new combat selection tests. September 1966.

Details the construction of new experimental forms of the Classification Inventory (CI) and of the General Information Test (GIT), two component tests of the Army Classification Battery used in the initial classification of enlisted men. Items in the experimental forms are being validated against actual combat criteria using data collected in Vietnam.

25. RM 66-8. M. A. Seawright, W. D. Larkin, and S. A. Sachs. Studies on methods of random number generation for computer simulation. November 1966.

Compares the statistical properties of four methods of producing random number sequences.

26. RM 66-9. W. D. Larkin. Evaluation of modified optimal regions algorithm for manpower systems experiments. November 1966.

Presents a modification of the optimal regions technique which provides a means of dealing with tied scores. A series of partial solutions is accepted rather than demanding a single complete solution. While the series of partial assignments does not preclude the possibility that a small group of individuals with tied scores will remain incapable of assignment, such a group is likely to be so small that the allocation sum will be little affected, however the individuals with tied scores are assigned.

27. RM 66-10. Richard C. Sorenson. Criterion considerations for manpower models. November 1966.

Paper presented before the Human Factors Working Group of the Military Operations Research Society at Monterey, California, 24 May 1966. Discusses criterion variables for evaluating systems as falling into two categories--restriction criteria used when a model is designed to identify infeasible policies, and maximization criteria used to identify an optimal policy or set of policies. The criterion index of the real system--the value of the system output--may be considered to be best represented by some function of the multiple optimization criteria. To improve model predictions, the criterion index needs to have a high degree of isometry with the measure of system effectiveness accepted by management.

28. RM 66-11. Leonard V. Gordon. An approach to the identification of personality types. December 1966.

As part of an effort to identify value constructs significant to military adjustment and effectiveness in specialized assignment, a model was tried out in which groups of persons were intercorrelated on the basis of group means on a set of interpersonal value measures. The groups were socially distinguishable, such as prisoners, military personnel, and students. From a factor analysis of the correlation matrix, four factors were clearly defined by groups with very high loadings--institutional restraint, control of others, service to others, and self-determination--accounting for 98.5 percent of the variance. The methodology is potentially applicable in such personnel management activities as assembling individuals in teams and work groups.

29. RM 67-1. Elizabeth Niehl. A general computer simulation for conducting allocation experiments. February 1967.

To facilitate experiments involving the generation of simulated samples, BESRL research scientists have developed a general simulation program designed to perform the many operations common to experiments in which alternative allocation policies are evaluated. The program is easily modifiable to handle computations specific to different experiments.

30. RM 67-2. Robert N. Harris. A model sampling experiment to evaluate two methods of test selection. March 1967.

Two test selection procedures were compared: test selection for absolute prediction, which selects the battery having the best mean prediction for all jobs, and for differential prediction, which selects the battery providing the best prediction of relative success in several jobs. For the optimal assignment of personnel, batteries of three sizes selected for differential prediction yielded significantly higher average predicted performance than did batteries selected for absolute prediction.

RESEARCH TASKS

U. S. Army Behavioral Science Research Laboratory

Research Tasks included in the current BESRL Research and Development
Work Program for FY 1967 are briefly described. Task Statements are
grouped according to the BESRL Division in which the research is accom-
plished. Numbers appearing at the conclusion of the Task Statement
designate publications abstracted or listed on pages 3 through 20.

Support Systems Research Division

RESEARCH TASK: Command Information Processing Systems. FY 1967.

The Army's automated data systems within the Army in the FIELD (ADSAF)
must be prepared to process and use vast amounts of military data from
a variety of sources. The mission of BESRL's COMMAND SYSTEMS Task is
to aid users and developers of these information processing systems by
providing research information on (1) the capabilities, limitations,
and reliability of human performance and the implications of these for
system design, (2) allocation of functions among men and equipment,
(3) various modes and sensory modalities of presenting information for
assimilation and decision making, (4) individual and group work methods
and techniques, and (5) procedures for identifying and assigning appro-
priate personnel to critical positions. Objective performance measures
for the evaluation of system and subsystem are developed.

In the Task laboratory, selected aspects of information processing functions are simulated. Through use of input devices, random access retrieval-display devices, and other equipment, empirical studies can be conducted on a range of display and presentation factors--among them format, coding, rate and degree of updating, and different sensory modalities to determine impact of variations in such factors on information transfer and decision making. Different work methods, techniques, and personnel configurations are tried out to determine how accuracy, completeness, and speed of information assimilation are affected.

Relationship between certitude and other aspects of information assimilation is under study. A beginning has been made with completion of a study dealing with subjective probability and decision behavior in a perceptual task. Studies of man-computer generated probability data, decision alternatives, and consequences are projected. 7.

RESEARCH TASK: The Determination of Interpreter Techniques in a Surveillance Facility. FY 1967.

The fluid nature of modern warfare imposes a requirement for continued and extensive aerial surveillance of enemy activity and terrain. Imagery to be processed continues to increase in volume and in variety. At the same time, tactical operations demand more rapid information extraction. To provide more than fragmentary information to commanders with the required speed, it is necessary that as much of the interpretation process as possible be automated. Within the foreseeable future, however, image interpreters will be needed to screen and interpret the imagery.

Research on interpreter functions within existing systems was initiated by the Behavioral Science Research Laboratory in FY 1965. Early studies established the necessity for enhancing both the accuracy and completeness of interpretation to meet the crucial and exacting demands of modern tactical operations. An expanded research effort was formulated to apply to the broad area of surveillance systems. The research is conducted as an integrated in-house and contractual effort, the latter provided by organizations selected as having superior capabilities for research in aerial surveillance. Within BESRL, an Information Systems Laboratory has been established in which computerized equipment is used to simulate variations in display mode, image quality, image enhancement devices, and other aspects of information processing as specified for experimentation.

THE INTERPRETER TECHNIQUES Task focuses on improving the work methods and procedures employed by image interpreters in a surveillance facility so as to result in more timely, accurate, and complete extraction of intelligence information. Research extends to all phases of the interpreter's job--screening, identification of targets, target location and plotting, mensuration, change detection--using the complete range of

imagery, including vertical and oblique photos, infrared and radar imagery.
A further effort is directed toward improving the methods by which informa-
tion requirements are stated to the interpreter and evaluating practices
of furnishing the interpreter with information derived from other sources
which may be related to his search of the imagery. 1, 9, 11, 13.

RESEARCH TASK: Influence of Displays on Image Interpreter Performance. FY 1967.

The ultimate test of equipment--new and old--in image interpretation
systems is the improvement it effects in interpreter performance. In
the IMAGE INTERPRETATION DISPLAYS Tasks, equipment proposed for inter-
pretation facilities can be simulated in the Information Systems Labora-
tory and the potential influence of changed equipment performance evalu-
ated. A variety of display conditions can be tested to determine the
most efficient layout for tactical imagery and related reference materials.

A major concern of the Task is the relationship of image quality to infor-
mation extraction. Previous BESRL studies have shown a decrement in per-
formance with imagery of lower quality. Also, interpreter performance
was equally good with positive and negative transparencies. However,
this finding resulted from comparisons using photographs differing consid-
erably in quality. Image quality loss occurring when an opaque print was
reproduced from a transparency did not result in performance decrement.

A study completed in FY 1966 demonstrated the feasibility of developing
a psychophysically derived measure of image quality. The validation of
such a measure entails its application with photographs representing the
total quality range expected under operational conditions.

In a subtask concerned with reference displays, intensive analysis of
interpreter errors was used to define areas where special kinds of
references are needed. Specially developed image interpreter keys and
map references that give promise of satisfying interpreter needs are
tested under controlled conditions with measures of interpreter output
as criteria. Methods of organizing the references available in a
facility have been studied to devise means of rapid identification of
pertinent material and quick access to it. Viewers and image enhancement
devices are analyzed in experimental use with a view to selecting those
most useful in an image interpretation facility and defining appropriate
methods of use. Studies also bear on the effects of varying bandwidths
of transmitted photographs and conditions affecting images received
through multipath transmission. 1, 8.

RESEARCH TASK: Man-Computer Functions in an Advanced Image Interpretation Processing System. FY 1967.

Only with the aid of a high-speed computer will interpreters be able to achieve the levels of output required of an advanced surveillance information processing system handling heavy loads of imagery from a variety of sensors. In the MAN-COMPUTER FUNCTIONS Task, allocation of functions and interrelationships between interpreters and computer are studied intensively with the objective of determining how a computer can be used to increase the quality and quantity of the intelligence output. Among specific objectives are the definition and evaluation of input-output procedures in an advanced facility, the development of an integrated indexing system for storing and retrieving, manually or automatically, the varieties of information of concern in a surveillance information processing system, and--a less tangible product but one of high potential significance--the development of techniques whereby the computer can supplement the decision processes of the interpreter, perform his calculations, and evaluate his accuracy and completeness.

The effort has resulted in the specification of relevant variables for assessing the accuracy and completeness of interpreter identifications. Suitable methods for predicting the probability that an interpretation is correct have been devised. The effectiveness, in terms of improved performance, of providing the interpreters with these computer-derived estimates has been studied.

Current and projected studies cover intra-system information transfer and control, and the development and refinement--and simulated field evaluation--of methods in which estimated costs of specified kinds of interpretation errors are derived from judgments of staff officers and used to control interpreter-computer reporting techniques. 5, 12, 15, 16, 18.

RESEARCH TASK: Integrating Men, Equipment, and Procedures in Surveillance Information Processing. FY 1967.

Studies in the COMPONENT INTEGRATION Task are directed toward orderly development of a smoothly functioning surveillance information processing system and the evaluation of the total system under real or simulated conditions. Specific studies include (1) the determination of the number and type of interpreter duty stations needed within an advanced surveillance system, (2) identification of procedures for the maintenance and improvement of personnel proficiency within the system, (3) identification of effective team organization and procedures under various system requirements, (4) development of system controls to guide the flow of imagery and information, and (5) the integration, evaluation, and improvement of the total system configuration of men, equipment, and procedures.

A primary goal has been the development of a standard measurement package
by which performance of systems embodying alternative concepts and config-
urations may be compared. Current effort is on the adaptation of such
a test package for use in semi-automated surveillance systems.

In sum, the task aims at the acquisition of reliable empirical and simu-
lation data concerning surveillance system operations, components, and
performance characteristics from which designers can confidently construct
future systems. 2, 14.

Combat Systems Research Division

RESEARCH TASK: Dependable Performance in Monitor Jobs. FY 1967.

Complex weapons and surveillance systems demand a high degree of alert-
ness and dependability. Operators in these systems must make fairly
simple responses at appropriate times and must continue to respond
accurately and quickly when required to work long hours under arduous,
fatiguing, or boring conditions. The MONITOR PERFORMANCE Task emphasizes
applied vigilance research through simulation of the relevant aspects
of many of these Army monitor jobs in a laboratory setting where experi-
mental controls can be maintained. Laboratory apparatus capable of
simultaneous or independent presentation of many different signals on
meters, speakers, dials, scopes, lights, and alpha-numeric displays is
used to investigate the effects on monitoring performance of factors
associated with signal, task, environment, and the individual. Visual,
auditory, and tactile sense modalities are represented, as well as
variations in background noise and illumination and variety of response
devices. The interaction effects of factors affecting vigilance are
emphasized.

Problem areas under study include the effects of signal discrimination
difficulty on detection performance, comparison of alternative work
methods, use of multi-sensory monitoring to increase total monitoring
capacity, identification of potentially superior monitor personnel, and
the prediction of performance trends during monitoring vigils.

Another work unit is represented by human factors studies in signal acquisition and processing--an expansion of on-going research in special devices search and analysis. The effort is responsive to current problems specific to particular monitoring operations important to the U. S. Army Security Agency.

RESEARCH TASK: Improving Tactical Voice and Code Communications. FY 1967.

Research on operator functions is directed toward improvement of transcription procedures through investigation of the effects of such factors as redundancy, repetition, enhanced discrimination of speech sounds, and the operator's ability to judge the level of his own performance. Research is concerned with uncovering principles which hold for a variety of operations. Focus is on the message in speech form, since results from research on speech communication can be applied to code situations, but not the reverse.

In research dealing with the signal, concentration is on physical processing which can be applied after reception of the signal. The purpose is to take advantage of the auditory capabilities of the operator. In a study of narrow-band filtering to increase the intelligibility of voice messages embedded in noise, for example, the objective is to make use of the integrative property of the hearing mechanism. These studies are also expected to result in fuller knowledge of signal-noise complexes in relation to message intelligibility.

Identification of noise characteristics which are particularly destructive of intelligibility is of obvious use in specifying communications jamming signals--a useful product since one major objective of the task is to develop more effective tactical electronic countermeasures.

A further objective is to improve the noise- and distortion-resistant qualities of message languages, by selection of language elements for ease of discrimination one from another and for maximum distinctiveness in relation to representative samples of noise from environments of interest.

When levels of confidence (probability of being correct) are attached to data, successive command levels are able to make fuller use of the intelligence received. Data indicate that operators can rate their transcriptions of intercepted communications well enough to make such a procedure of great value in combat operations. The more highly trained the operator both in transcribing and in rating his own product, the more accurate are his estimates of the accuracy with which he has transcribed a message, regardless of the noise level mixed with the signal. 4.

Statistical Research and Analysis Division

RESEARCH TASK: Computerized Systems for Manpower Policy Evaluation. FY 1967.

The Task applies principles and techniques of mathematical and industrial psychology, statistics, operations research, and computer technology to the evaluation of alternative manpower policies. A pervading objective is to develop quantitative techniques and computer-aided research methods for dealing with personnel management problems.

The Task continues BESRL's basic contributions to quantitative methodology relating to the inventory, allocation, and quality control of personnel extending back a decade and more. Studies were conducted to assess the feasibility of alternative approaches to optimal assignment of enlisted men, and for determining the gains that could accrue from a computerized optimal assignment procedure. Feasible quantitative models and computing algorithms for optimal assignment of enlisted men were produced. In addition, simulation studies have been conducted and answers provided to such personnel management questions as the effect of alternative rotation policies on officer turbulence and, conversely, the manpower base required to sustain given policies. Through model sampling studies, the effect of characteristics of classification test batteries and of personnel information systems has been estimated.

The Task looks to provide expanded manpower management control through (1) more accurate assessment of manpower requirements, (2) improved techniques for assessing the consequences of contemplated policy changes or innovations, and (3) increased knowledge of the effect of procurement, distribution, training, and reassignment policies on manpower quality. 3, 21, 25, 26, 29, 30.

RESEARCH TASK: Operations Research for Manpower Management. FY 1967.

This task was in existence through FY 1967 as an augmentation of the research effort of the COMPUTER MANPOWER SYSTEMS Task. Effort was in two directions--to extend successful modeling techniques to a greater variety of manpower problems and to provide further generalizations of models developed to answer specific questions. The generalized models obviate the necessity for time-consuming reprogramming when additional parameter and policy variables are to be considered. 20, 27.

Military Selection Research Division

RESEARCH TASK: Methods for Improving Enlisted Input Quality. FY 1967.

Army induction and enlistment policy bases acceptance in large part on
measures of aptitudes related to likelihood of successful performance in
Army jobs. Measures of general military trainability and supplementary
measures of specific aptitudes are developed periodically, using a grow-
ing body of psychometric methodology. Research products must reflect
military policy and organization as well as standards for military service
established by the Congress. The continuing objective is to improve the
system of screening potential input so as to identify and reject those
who are not readily trainable and usable.

Instruments now in operational use include the Enlistment Screening Test
administered by recruiters to determine whether men seeking to enlist
are likely to meet mental standards for service and should be sent on
to Armed Forces Examining and Entrance Stations for further testing; the
Armed Forces Qualification Test--overall measure of trainability for both
enlistees and inductees; the Army Qualification Battery, a set of short
tests permitting evaluation of specific abilities, and special devices
to aid in identifying deliberate failures. Tests for women applicants
for enlisted service include preenlistment screening and qualification
tests.

A recent requirement is for a differential battery for use by all the
services. The battery would provide measures of specific aptitudes and
abilities which could be used in determining qualification for training
assignments.

Research approaches to increasingly effective screening methods are
represented in the following projects: tryout and analysis of new types
of test content and format; innovations in methods of detecting deliberate
failures; investigation and development of promising test methodology,
including very short limited ability range tests for pre-screening; and
exploration of the use of a programmed testing machine to facilitate
research.

Added research effort goes into the development of technical information
for use in consultative assistance to staff agencies responsible for
procurement and standards policies and to Department of Defense officials
for use in qualitative manpower studies and programs. Current programs
and discussions concerning marginal personnel and selective service may
result in new requirements for research. 17.

RESEARCH TASK: New Techniques for Enlisted Classification. FY 1967.

Classification of new enlisted personnel is based to a large extent on
test scores of the Army Classification Battery (ACB), combined into
aptitude area composites differentially predictive of performance in
groups of related jobs--the occupational areas. The objective of initial
classification is to assign enlisted personnel across the full range of
Army jobs so as to make best use of the potential and developed skills
of available manpower. The research objective is to develop and maintain
measures of maximal differential value--measures highly valid for one set
of Military Occupational Specialties (MOS) and of relatively low validity
for other MOS.

Previous BESRL research led in 1949 to implementation of the aptitude
area system based on ten aptitude tests in place of the single measure
used in World War II. A major revision of the system in 1955 made more
effective use of the tests and adjusted the aptitude area composites to
the occupational areas of a revised enlisted MOS structive. From 1957
to 1962, improved and updated forms replaced most of the tests in the
original battery, and in 1958 two measures of motivational content were
added to supplement the ability content of the ACB.

Present effort is toward improvement of the differentiating power of the
battery predictors so as better to distinguish potential for success in
different MOS groups. Another important emphasis is to devise additional
test content reflecting motivation.

Research which could lead to major revision of the ACB is now in progress,
based on factor analysis studies and six years of validity studies of
operational and experimental tests across a wide variety of MOS. Twenty
newly developed measures--about half with motivational content--showing
promise for particular job areas constitute the Army Differential MOS
Battery which was administered during FY 1965 to about 25,000 enlisted
men entering over 100 Army school courses and training programs. During
FY 1966, training and job performance data were collected on these men.
The goal is to use ACB scores in a computerized allocation system which
will provide personnel in numbers needed in given occupational fields
to meet Army force structure requirements. The computerized system
makes possible the use of complex aptitude area scores based on the
prediction afforded by the full ACB in place of the two-test composites
used heretofore.

The Task is also developing measures relating to identification and reten-
tion of potential career enlisted men. Studies are designed to enhance
understanding of the effects of basic training, initial AIT assignment,
MOS training, and initial unit assignment on reenlistment decision. 10, 23.

RESEARCH TASK: Research on Civilian Personnel Management Problems in the Army.   FY 1967.

The Task has sought a research basis for steps to achieve a smooth-work-
ing civilian personnel segment of the Army and more effective military-
civilian team operation.

Research dealing with recurring problems of civilian personnel management
was organized about three major problem areas: (1) interaction between
characteristics of civilian executives and specific content of their jobs;
(2) a survey of field conditions which may cause the critical duties of
first-line supervisors to vary with time and place; and (3) a study of
factors affecting motivation of research personnel in Army research and
development activities. Research in all three problem areas has been
accomplished under contracts monitored by Task personnel. A pilot study
of the effectiveness of communication within the Army's civilian personnel
system was conducted. 22.

RESEARCH TASK: Optimum Distribution of Abilities for Individual and Unit Effectiveness.   FY 1967.

The general impact of different mental standards for enlisted input on
Army effectiveness has not been satisfactorily evaluated. The performance
of marginally qualifying personnel in individual jobs has been the subject
of considerable attention, and a substantial body of findings on the apti-
tudes and ability levels significant for performance in selected groups
of jobs has accumulated--with emphasis on the adequacy with which individ-
uals in given mental categories meet training demands. The question for
manpower management, however, is not whether an individual of marginal
mental ability can maintain minimally satisfactory performance in a job.
Rather, it is what distribution of various ability levels is needed for
a unit as a whole to be effective in its mission.

The OPTIMUM MENTAL DISTRIBUTION Task, inaugurated in FY 1966, has the
ultimate objective of determining optimum numbers of enlisted men at dif-
ferent levels of ability which Army organizations can absorb and still
maintain effective performance. As a major step to this goal, the Task
is developing measures of the effectiveness of individuals and military
units so that units of varying composition can be compared. Variations
will seek to reach a balance between training and supervision liabilities
which inhere in the incorporation of below average men and unit personnel
effectiveness and arrive at estimates of maximum safe percentages of below
average input under different military requirements.

Methods include both field experiments and computer simulation. The
Task looks to the development of models which will make it possible to
estimate the effect of prospective changes in standards. Thus, relation-
ships established would be pertinent through changes in mental standards
under both peace and mobilization conditions.

Benchmark units will be studied in which jobs in selected MOS predominate. The performance measures will take into account not only mission accomplishment but also training and supervision demands, disciplinary actions, and other cost factors as related to the utility of marginal personnel.

Initial attention has been given the disciplinary fraction of the criterion, in response to expressed concern of the Army Chief of Staff and the Assistant Secretary of Defense for Manpower. Stockade prisoners convicted by courts martial are being compared with the reference population of Army enlisted personnel with respect to characteristics of likely significance. At the same time, a longitudinal study is under way to relate scores on several self-description scales to disciplinary record during training.

Behavioral Evaluation Research Division

RESEARCH TASK: Prediction of Officer Performance.   FY 1967.

In a present-day Army, many officer assignments require specialized capabilities, particularly for assignments entailing responsibility for the operation and tactical employment of modern weapons and communications systems. Application of the "generalist" principle in selection and rotational assignment may not give sufficient consideration to these requirements.

The OFFICER PREDICTION Task was established to provide the Army with improved techniques and prerequisites for selecting officers who have aptitudes and other characteristics to meet the differing demands of different officer assignments. An added gain can accrue from an expected increase in the numbers of qualified junior officers who elect to pursue a military career. An officer in an assignment compatible with his special abilities and career attitude, and performing effectively, would be more likely to find his military career satisfying. The research objective is, first, to determine whether successful performance in the different job areas is predictable, and if so, to develop measures of abilities which differentially predict successful performance as well as orientation toward an Army officer career. Field observation and analysis of officer MOS narrowed the prediction objective to combat, administrative, and technical job areas.

The basic research design involved development of experimental predictors and the differential validation of the predictors against situational performance criteria. The U. S. Officer Evaluation Center at Fort McClellan completed the unique mission of staging the continuous three-day

exercise which provided criterion evaluations of 900 officers previously
tested with the experimental battery. In FY 1967, officers still on
active duty from among 10,500 originally given the experimental measures
were identified for follow-up validation. Evaluations of combat or com-
bat support performance were obtained in Vietnam for those serving there.
The short range career orientation analysis involves relating test item
responses to remaining in the Army in order to determine how well the
experimental measures predict retention in the service--as well as quality
of performance. From a more exhaustive data analysis, BESRL research
scientists plan to structure an experimental retention battery, which
will in turn be validated. The complete validity analyses will constitute
a test of the hypothesis that abilities to meet the differing psychological
requirements of combat, administrative, and technical officer jobs are
differentially predictable.

RESEARCH TASK: Selection for Combat and Cold Warfare. FY 1967.

The Task continues a series of related research activities concerned with
the psychological requirements of individuals or small groups performing
under psychological and environmental hazards. In addition to the develop-
ment of classification measures for use in assigning enlisted men to train-
ing for combat, Task activities include research to aid in the selection
and utilization of men whose assignments require them to work effectively
with personnel of other nations and cultures. Successful performance in
assignment in Army groups such as MAAG, Special Warfare, and Civil Affairs
may call for special characteristics and qualifications beyond those
required of military personnel is more conventional assignments.

Past BESRL research has indicated that further improvement in the identi-
fication of individuals likely to be successful in combat or atypical
military duty is more likely to come through research on measurable per-
sonality factors rather than through dependence on measures of aptitude
or ability factors. This finding is the basis for the development of
new test content designed to provide replacement forms for the current
operational measures of combat potential in the Army Classification
Battery--the Classification Inventory and the General Information Test.
Experimental measures are now undergoing validation against evaluations
of combat performance obtained in Vietnam. To determine the differential
predictive value of new measures, validation is also conducted against
performance in noncombat jobs. Included is the development of a combat
or combat-type criterion of performance for the validation of selected
measures. 24, 28.

RESEARCH TASK: Psychological Measures for Use in Primary Officer Selection and Evaluation Programs. FY 1967.

Major primary training programs through which the Army obtains officers for commissioning are the U. S. Military Academy, the senior division of the Reserve Officer Training Corps, and Officer Candidate Schools. Research conducted by the U. S. Army Behavioral Science Research Laboratory over a number of years has resulted in the development, improvement, and implementation of tests of mental ability, physical proficiency, and leadership for use in selecting individuals for appointment as cadets and candidates for later commissioning.

Emphasis in the current research program is on modernizing current OCS and ROTC selection procedures, particularly with respect to the assessment of the career motivation and leadership potential of applicants. Increasing importance of the Army ROTC training program as a major source for newly commissioned second lieutenants in the Regular Army and in the Army Reserve requires the updating of current selection procedures and the development of new valid procedures for identifying the best applicants for the various aspects of the senior ROTC division program, including scholarship programs and a two-year program initiated in FY 1966. A similar requirement to update selection instruments has arisen in the OCS program which was considerably expanded in FY 1966. The aim is to reduce attrition in each training program and to attain, through improved selection, graduates of higher caliber and better career motivation. An interim selection battery has been prepared to meet the needs of the expanded OCS program.

DEPOSITORY LIBRARIES

BESRL Research Publications

BESRL Technical Research Reports and Research Notes are on file in each of the following libraries, listed by state.

Alabama

    University of Alabama Library
    Reference Department
    University, Alabama 35486

    Auburn University
    Ralph Brown Draughon Library
    Serials Department
    Auburn, Alabama 36830

Alaska

    University of Alaska Library
    Government Documents Division
    College, Alaska 99735

Arizona

    Arizona State University
    Matthews Library
    Documents Librarian
    Tempe, Arizona 85281

    University of Arizona Library
    Acquisitions Department
    Tucson, Arizona 85721

Arkansas

    Arkansas State College Library
    Acquisitions Librarian
    State College, Arkansas 72467

California

    University of California
    General Library
    Documents Department
    Berkeley, California 94720

    University of California Library
    Government Publications Room
    405 Hilgard Avenue
    Los Angeles, California 90024

    California State Library
    Documents Section
    Sacramento, California 95809

    San Diego State College Library
    San Diego, California 92115

    The Honnold Library
    Documents Department
    Claremont, California 91711

    University of California Library
    Documents Section
    Riverside, California 92502

    University of California Library
    Government Publications Department
    Santa Barbara, California 93106

California (Continued)

University of California Library
Documents Department
Davis, California 95616

Library, University of
Southern California
700 West 35th Place
Los Angeles, California 90007

University of California Library
Government Publications Section
Irvine, California 92650

San Fernando Valley State College
Library-Acquisitions Department
18111 Nordhoff Street
Northridge, California 91324

Colorado

Colorado State University
The University Libraries
Documents Librarian
Fort Collins, Colorado 80521

University of Colorado Libraries
Government Documents Division
Boulder, Colorado 80304

Delaware

University of Delaware
Morris Library
Documents Department
Newark, Delaware 19711

District of Columbia

Library of Congress
Washington, D. C. 20540

Florida

Florida State University Library
Documents Division
Tallahassee, Florida 32306

University of Florida Libraries
Documents Division
Gainesville, Florida 32603

University of South Florida Library
Documents Division
Tampa, Florida 33620

Hawaii

University of Hawaii Library
Government Documents Collection
2425 Campus Road
Honolulu, Hawaii 96822

Illinois

University of Illinois Library
Documents Division
Urbana, Illinois 61803

Center for Research Libraries
5721 Cottage Grove Avenue
Chicago, Illinois 60637

Northwestern University Library
Documents Department
Evanston, Illinois 60201

University of Chicago Library
Documents Librarian
Chicago, Illinois 60637

Illinois State University
Milner Library
Acquisitions Department
Normal, Illinois 61761

Southern Illinois University
The General Library
Serials Department
Carbondale, Illinois 62903

Illinois (Continued)

    Northern Illinois University
    Swen Parson Library
    Documents Department
    DeKalb, Illinois 60115

    Western Illinois University Library
    Macomb, Illinois 61455

Indiana

    Purdue University Library
    Documents Librarian
    Lafayette, Indiana 47907

    Indiana State Library
    Documents Librarian
    140 N. Senate Avenue
    Indianapolis, Indiana 46204

    Indiana University Library
    Documents Librarian
    Bloomington, Indiana 47405

    Indiana State University
    Director of Libraries
    Terre Haute, Indiana 47809

    Ball State University Library
    Muncie, Indiana 47306

Iowa

    State College of Iowa
    Library - Serials - A
    Cedar Falls, Iowa 50613

Kansas

    University of Kansas Library
    Documents Librarian
    Lawrence, Kansas 66045

Kansas (Continued)

    Kansas State University Library
    Acquisitions
    Manhattan, Kansas 66502

Kentucky

    University of Kentucky
    University Libraries -
    Continuation Division
    Acquisition Department
    Lexington, Kentucky 40506

Louisiana

    Louisiana State University Library
    Baton Rouge, Louisiana 70803

Maine

    University of Maine
    Raymond H. Fogler Library
    Documents Librarian
    Orono, Maine 04473

Maryland

    University of Maryland
    McKeldin Library
    Social Science Department
    College Park, Maryland 20742

    Johns Hopkins University Library
    Acquisitions
    Baltimore, Maryland 21218

    Enoch Pratt Free Library
    Documents Division
    Baltimore, Maryland 21201

Massachusetts

    Lesley College
    Livingston Stebbins Library
    Cambridge, Massachusetts 02138

Michigan

    Detroit Public Library
    Book Receiving Department
    5201 Woodward Avenue
    Detroit, Michigan 48202

    University of Michigan Library
    Documents Librarian
    Ann Arbor, Michigan 48104

    Michigan State University Library
    Documents Librarian
    East Lansing, Michigan 48823

    Eastern Michigan University Library
    Ypsilanti, Michigan 48197

    Wayne State University Library
    Documents Librarian
    Detroit, Michigan 48202

    Western Michigan University
    Dwight B. Waldo Library
    Documents Librarian
    Kalamazoo, Michigan 49001

Minnesota

    University of Minnesota
    Walter Library
    Documents Division
    Minneapolis, Minnesota 55455

Mississippi

    Mississippi State University
    Mitchell Memorial Library
    Acquisition Department
    Serials Section - Box 1517
    State College, Mississippi 39762

    University of Southern
    Mississippi Library
    P. O. Box 53, Station A
    Hattiesburg, Mississippi 39401

Missouri

    Kansas City Public Library
    Documents Division
    311 East 12th Street
    Kansas City, Missouri 64106

    University of Missouri Library
    Serials Department
    Columbia, Missouri 65202

Nebraska

    University of Nebraska Library
    Documents Librarian
    Lincoln, Nebraska 68508

New Hampshire

    Dartmouth College
    Baker Library
    Reference Department
    Hanover, New Hampshire 03755

New Jersey

    Princeton University Library
    Documents Librarian
    Princeton, New Jersey 08540

    Rutgers University Library
    Periodical Department
    New Brunswick, New Jersey 089(

New Mexico

    University of New Mexico
    Zimmerman Library
    Serials Department
    Albuquerque, New Mexico 87106

New York

    Brooklyn Public Library
    Documents Division
    Grand Army Plaza
    Brooklyn, New York 11238

New York (Continued)

Columbia University Libraries
Documents Acquisition
535 West 114th Street
New York, New York 10018

Cornell University Libraries
Government Documents
Ithaca, New York 14850

New York Public Library
Government Documents
5th Avenue and 42nd Street
New York, New York 10018

New York State Library
Gift and Exchange Section
Albany, New York 12224

Syracuse University Library
Serials Division
Syracuse, New York 13210

Brooklyn College
Social Sciences and Education
Divisions Library
Brooklyn, New York 11210

State University College Library
Documents Librarian
Potsdam, New York 13676

State University College
Milne Library
Geneseo, New York 14454

State University of New York
Agricultural and Technical College
Library-Periodical Department
Alfred, New York 14802

State University College
James M. Milne Library
Oneonta, New York 13820

Hofstra University Library
Documents Department
Hempstead, New York 11550

North Carolina

Duke University Library
Public Documents Division
Durham, North Carolina 27706

North Carolina State College
D. H. Hill Library
Raleigh, North Carolina 27607

University of North Carolina Library
BA/SS Division - Documents
Chapel Hill, North Carolina 27515

Ohio

Bowling Green State University Library
Acquisitions Department
Bowling Green, Ohio 43402

Kent State University Library
Documents Librarian
Kent, Ohio 44240

Ohio University Library
Athens, Ohio 45701

Miami University Library
Documents Librarian
Oxford, Ohio 45056

Ohio State University Libraries
Documents Division
1858 Neil Avenue
Columbus, Ohio 43210

Oberlin College Library
Documents Library
Reference Department
Oberlin, Ohio 44074

Oklahoma

Oklahoma State Library
Public Documents Division
109 State Capitol
Oklahoma City, Oklahoma 73105

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Oklahoma (Continued)

Oklahoma State University
Documents Librarian
Stillwater, Oklahoma 74075

Central State College
Max Chambers Library
Government Publications
Edmund, Oklahoma 73034

Oregon

University of Oregon Library
Documents Division
Eugene, Oregon 97403

Oregon State Department of Education
Division of Education Development
302 Public Service Building
Salem, Oregon 97310

Oregon State University Library
Documents Division
Corvallis, Oregon 97331

Pennsylvania

Free Library of Philadelphia
Public Documents
Philadelphia, Pennsylvania 19103

Carnegie Library of Pittsburgh
Reference Department
Pittsburgh, Pennsylvania 15213

Lehigh University Library
Bethlehem, Pennsylvania 18015

Pennsylvania State University Library
Documents Librarian
University Park, Pennsylvania 16802

American Institutes for Research
410 Amberson Avenue
Pittsburgh, Pennsylvania 15232

Pennsylvania (Continued)

Pennsylvania State Library
Technical Services, Room 46
Box 1601
Harrisburg, Pennsylvania 17126

Community College of Philadelphia Library
34 South 11th Street
Philadelphia, Pennsylvania 19103

Rhode Island

Brown University Library
Documents Division
Providence, Rhode Island 02912

University of Rhode Island Library
Kingston, Rhode Island 02881

Tennessee

University of Tennessee Librar·
Documents Librarian
Knoxville, Tennessee 37916

Joint University Libraries
Serials and Documents
Nashville, Tennessee 37203

Texas

Dallas Public Library
Documents Librarian
Dallas, Texas 75201

Texas State Library
U. S. Documents Section
Drawer DD, Capital Station
Austin, Texas 78711

Utah

University of Utah
Library Periodical Room
Salt Lake City. Utah 84112

Utah (Continued)

Brigham Young University Library
Documents Section
Provo, Utah 84601

Utah State University Libraries
Documents Division
Logan, Utah 84321

Virginia

University of Virginia
Alderman Library
Public Documents
Charlottesville, Virginia 22903

Washington

University of Washington Library
Documents Librarian
Seattle, Washington 98105

Washington State University
Social Science Library
Pullman, Washington 99163

West Virginia

West Virginia University
Reference Department
Morgantown, West Virginia 26506

Wisconsin

Milwaukee Public Library
Acquisition Division
814 West Wisconsin Avenue
Milwaukee, Wisconsin 53233

The Library
University of Wisconsin-Milwaukee
2500 E. Kenwood Boulevard
Milwaukee, Wisconsin 53211

Wyoming

University of Wyoming Library
Documents Librarian
Laramie, Wyoming 82071

U. S. ARMY PERSONNEL PROGRAMS
utilizing psychological research test products of the
U. S. Army Behavioral Science Research Laboratory

PROGRAM	NUMBER OF APPLICANTS TESTED ANNUALLY
Pre-enlistment Screening of Male Enlistment Applicants	
To screen men enlisting or reenlisting from civilian life who must be tested prior to traveling to Armed Forces Examining Stations for Armed Forces Qualification Test (AFQT) administration.	
<u>Tests</u>: Enlistment Screening Test, EST.	475,000
Screening of Male Enlistment Applicants	
To screen men on mental acceptability prior to enlist· ment at AFEES.	
<u>Tests</u>: Armed Forces Qualification Test, AFQT. Army Qualification Battery, AQB,	350,000 300,000
Pre-enlistment Screening of Female Enlistment Applicants	
To screen women enlisting or reenlisting from civilian life who must be tested prior to traveling to Armed Forces Examining Stations for Armed Forces Women's Selection Test (AFWST) administration.	
<u>Tests</u>: Women's Enlistment Screening Test, WEST.	8,100
Screening of Female Enlistment Applicants	
To screen women for mental acceptability prior to enlistment.	
<u>Tests</u>: Armed Forces Women's Selection Test, AFWST. Women's Army Classification Battery, WACB.	5,400
Screening and Counseling of Male High School Seniors	
To screen high school seniors and provide guidance regarding their aptitude potential for Army jobs.	
<u>Test</u>: Army Qualification Battery, High School Edition.	75,000

PROGRAM	NUMBER OF APPLICANTS TESTED ANNUALLY
Enlistment Screening of Male Reserve and National Guard Applicants	
To screen men for mental acceptability prior to enlistment in the Army Reserve or the Army National Guard.	
<u>Tests</u>: Armed Forces Qualification Test, AFQT (Reserve Components Edition). Army Qualification Battery, AQB (Reserve Components Edition).	290,000
Screening of Selective Service Registrants	
To screen Selective Service Registrants for mental acceptability prior to induction.	
<u>Tests</u>: Armed Forces Qualification Test, AFQT. Army Qualification Battery, AQB.	1,064,000 230,000
Detecting Deliberate AFQT Failures	
To aid personnel psychologist in verifying AFQT failures among Selective Service Registrants with percentile scores of 0 through 9 on AFQT.	
<u>Tests</u>: Included within Terminal Screening Procedures	130,000
Screening of Insular Puerto Rican Selection Service Registrants	
To screen Selective Service Registrants in Puerto Rico who must undergo mental acceptability testing in Spanish prior to induction into the Army for training.	
<u>Tests</u>: Examen Calificacion de Fuerzas Armadas, ECFA. English Fluency Battery, EFB. **Army Classification Battery, ACB**	16,000
Initial Classification of Enlisted Male Personnel	
To determine MOS appropriate for direct award, and MOS recommended for advanced training of replacement stream enlisted personnel processed through Reception Stations.	
<u>Tests</u>: Army Classification Battery, ACB. (Standard Scores on 11 tests are converted into 8 Aptitude Area composites.)	480,000

PROGRAM	NUMBER OF APPLICANTS TESTED ANNUALLY
<u>Initial Classification of Motor Vehicle Drivers</u> To screen individuals during Reception Station processing as a prerequisite to licensing for driver assignments. <u>Tests</u>: Motor Vehicle Driver Selection Battery I, MDB-I	480,000
<u>Selection of Basic Trainees for Training as Acting NCOs</u> To select basic trainees for training as acting NCOs. Selection is based on peer ratings of leadership potential obtained during the fifth week of Basic Combat Training. Individuals selected are given two weeks of NCO training upon completion of their Basic Combat Training, and serve as acting NCOs during Advanced Individual Training. <u>Tests</u>: Leadership Potential Rating, LPR. (This procedure consists of a ranking procedure within training squads, followed by a rating of leadership potential on a seven-point scale.)	480,000
<u>Licensing Drivers of Army Motor Vehicles</u> To determine qualifications of military personnel, civilians, and indigenous personnel for standard driver licenses. <u>Tests</u>: Motor Vehicle Driver Selection Battery II, MDB-II (unless previously qualified on MDB-I). Testing Procedures for Licensing Drivers of Army Motor Vehicles: Includes physical evaluation and driving performance test.	200,000
<u>Selection of Personnel for Foreign Language Training</u> To screen personnel for foreign language aptitude as a prerequisite for application for training at the Army Language School. <u>Tests</u>: Army Language Aptitude Test, ALAT	98,000

PROGRAM	NUMBER OF APPLICANTS TESTED ANNUALLY
Measurement of Foreign Language Proficiency To determine the extent to which military personnel meet qualifying standards of proficiency in specified foreign languages. Tests: **DOD Language Proficiency Tests in the following** languages: Albanian, Arabic Iraqui, Bulgarian, Burmese, Chinese Cantonese, Chinese Mandarin, Czech, Danish, Dutch, Finnish, French, German, Greek, Hebrew, Hungarian, Icelandic, Indonesian, Italian, Japanese, Korean, Lithuanian, Norwegian, Persian, Polish, Portuguese, Romanian, Russian, Serbo-Croatian, Slovenian, Spanish, Thai, Turkish, Ukrainian, Vietnamese, Yiddish.	49,500
Selection of Enlisted Recruiters To screen potential enlisted recruiters on the basis of sales adaptability as a prerequisite for appearance before an interviewing board. Tests: Recruiter Self-Description Blank, Form II (Sales Adaptability).	16,000
Measurement of Skill in Shorthand and Typing To obtain typing and dictation scores for those enlisted personnel undergoing reception station processing who claim skill in typing and shorthand. Scores obtained are used in determining the individual's most appropriate training and assignment. Tests: Typing and Dictation Test	Data not available

Selection for Training and Assignment in Special Forces Organizations
 	
To determine the aptitude of enlisted volunteers in the Active Army and in the Army Reserve for training and assignment in Special Forces organizations.
 	
Tests: Special Forces Selection Battery, consisting of
    a. Special Forces Locations Test, SFL.
    b. Critical Decisions Test, CDT.
    c. Special Forces Suitability Inventory, SFI.
	15,000

PROGRAM	NUMBER OF APPLICANTS TESTED ANNUALLY
Selection of Personnel for Training as Army Aviators	
To screen male personnel who volunteer for fixed-wing or rotary-wing aviator training courses.	
Tests: 1. For administration to officers applying for officer aviator courses. **Flight Aptitude Selection Tests, FAST**	4,000
2. For administration to enlisted men and enlistment option applicants volunteering for Warrant Officer Candidate aviation courses. **Flight Aptitude Selection Tests, FAST**	120,000
Selection of ROTC Cadets for Fixed-Wing Aviation Training	
To select ROTC Cadets for fixed-wing aviation flight training.	
Tests: Army Aviation Test Battery	2,500
Selection of Cadets for Junior College ROTC Training	
To select students at Military Schools Division Army ROTC units established at secondary level and junior college educational institutions for MST-5 and MST-6 ROTC training.	
Tests: General Screening Test, GST. (Testing occurs during senior high school year.)	1,000
Selection of Cadets for Senior Division Advanced ROTC Training	
To select cadets for Senior Division Advanced ROTC training from among students who are successfully completing or receiving credit for basic course (first two years college).	
Tests: ROTC Qualifying Examination, RQ. (Testing occurs during sophomore college year.)	45,000

PROGRAM	NUMBER OF APPLICANTS TESTED ANNUALLY
Selection of Male Personnel for Officer Candidate School	
To screen Warrant Officers and enlisted men in the Active Army and in the Army Reserve not on active duty who are applying for Officer Candidate School. Minimum scores on Aptitude Area GT and Officer Candidate Test, OCT are required as a prerequisite to administration of the Officer Candidate Selection Battery to Active Army Applicants.	160,000

<u>Tests</u>: Officer Candidate Selection Battery, consisting of:
   a. Officer Leadership Qualification Report, OLR-1.
   b. Officer Leadership Qualification Inventory, OLI-1.
   c. Officer Leadership Board Interview, OLB-1.
	50,000

Selection of Female Personnel for Officer Candidate School	
To screen Warrant Officers and enlisted women in the active Army and in the Army Reserve not on active duty who are applying for Officer Candidate School.	

<u>Tests</u>: WAC Officer Candidate Selection Battery, consisting of:
   a. WAC OCS Biographical Information Blank.
   b. WAC Officer Candidate Applicant Interview.
   c. WAC Officer Candidate Applicant Evaluation Report. (Minimum score on Aptitude Area GT required as a prerequisite to administration of the WAC Officer Candidate Selection Battery to Active Army applicants.)
	100

PROGRAM	NUMBER OF APPLICANTS TESTED ANNUALLY

Appointment of Male Personnel as Reserve Warrant Officers
 	
To select enlisted men in the Active Army and in the Army Reserve not on active duty for appointment as Reserve Warrant Officers.
 	
Tests: 1. For administration to enlisted men in the Active Army (except aviation):
    a. Officer Leadership Qualification Inventory, OLI
    b. Officer Leadership Board Interview, OLB
    c. Officer Leadership Qualification Report, OLR
  2. For administration to enlisted men not on active duty (except aviation):
    a. Officer Leadership Qualification Inventory, OLI
    b. Officer Leadership Board Interview, OLB
    c. Interview Appraisal Sheet S
	2,000

Appointment of Female Personnel as Reserve Warrant Officers To select enlisted women in the Active Army and in the Army Reserve not on active duty for appointment as Reserve Warrant Officers. Tests: WAC OCS Biographical Information Blank. WAC Officer Candidate Applicant Officer Interview. Interview Appraisal Sheet S.	20
Appointment of Male Personnel to Commissions in the United States Army Reserve To select male personnel in the following categories for appointment to commissions in the United States Army Reserve: Warrant Officers and enlisted men currently serving in any component of the Army; Reserve Warrant Officers and enlisted men who are currently serving in an active status in the Army Reserve; and former warrant officers and enlisted men. Tests: Officer Leadership Qualification Inventory, OLI. Officer Leadership Board Interview, OLB. Interview Appraisal Sheet M (for use with all applicants except technical experts or specialists) or Interview Appraisal Sheet S (for use with technical experts or specialists).	7,000

PROGRAM	NUMBER OF APPLICANTS TESTED ANNUALLY
Appointment of WAC Personnel to Commissions in the United States Army Reserve	
To select female personnel in the following categories for appointment to commissions in the United States Army Reserve: Warrant Officers and enlisted women currently serving in any component of the Army; Reserve Warrant Officers and enlisted women who are currently serving in an active status in the Army Reserve; and former warrant·officers and enlisted women.	
<u>Tests</u>: WAC OCS Biographical Information Blank. WAC Officer Candidate Applicant Interview. Interview Appraisal Sheet M (for use with all applicants except technical experts or specialists) or Interview Appraisal Sheet S (for use with technical experts or specialists).	100
Appointment of Male Personnel to Commissions in the Regular Army	
To select male personnel in the categories indicated below for appointment to commissions in the Regular Army.	
<u>Tests</u>: 1. For administration to officers on active duty, to former commissioned officers, and to applicants for commissions in Corps of the Army Medical Service: a. Interview Blank, Form 4. b. Biographical Information Blank, Form F.	
2. For administration to Warrant Officers and enlisted men on active duty and to former Warrant Officers and enlisted men: a. Officer Leadership Qualification Inventory, OLI. b. Officer Leadership Board Interview, OLB. c. Officer Leadership Qualification Report, OLR.	
3. For administration to ROTC Distinguished Military Graduates: a. ROTC Inventory, RI. b. ROTC Evaluation Report, RQE-2.	

PROGRAM	NUMBER OF APPLICANTS TESTED ANNUALLY
Appointment of Male Personnel to Commissions in the Regular Army (Continued)	

4. For administration to technical specialists possessing advanced degrees or possessing bachelor's degree with appropriate experience:
      a. Interview Blank, Form 4.
      b. Biographical Information Blank, Form F.
      c. Interview Appraisal Sheet S.	

5. For administration to scholastically outstanding graduates of accredited colleges and universities who did not take ROTC training for valid reasons:
      a. ROTC Inventory, RI
      b. Officer Leadership Board Interview, OLB.
	3,500

Appointment of Female Personnel to Commissions in the Regular Army
 	
To select female personnel in the categories indicated below for appointment to commissions in the Regular Army.
 	
Tests: 1. For administration to warrant officers and enlisted women on active duty and to former warrant officers and enlisted women:
      a. WAC Officer Candidate Applicant Interview.
      b. WAC Officer Candidate Applicant Evaluation Report.
      c. WAC OCS Biographical Information Blank.
 	
      2. For administration to applicants for Regular Army commissions in the Army Nurse Corps, the Women's Medical Specialist Corps, and the Medical Corps:
      a. Board Interview for Officers in the Army Medical Service.
      b. Biographical Information Blank for Women Officers in the Army Medical Service, BIB-AMS.
	200

SUPPLEMENTARY

INFORMATION

AD-825 541 Army Behavioral Science Research Lab., Washington, D. C. Technical research note. Rept. no. TRN-191 Aug 67	No Foreign without approval of Army Behavioral Science Research Lab., Washington, D. C.	No limitation	USABSRL ltr, 31 Jan 69